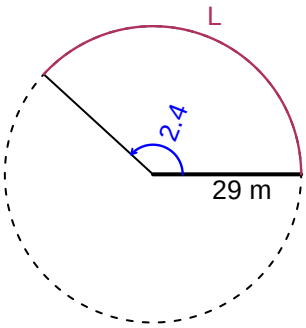
Name: Date:

Trig Final (SLTN v656)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 2.4 radians. The radius is 29 meters. How long is the arc in meters?

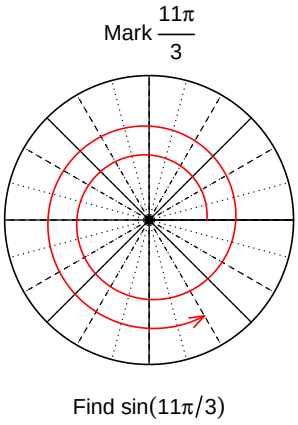


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

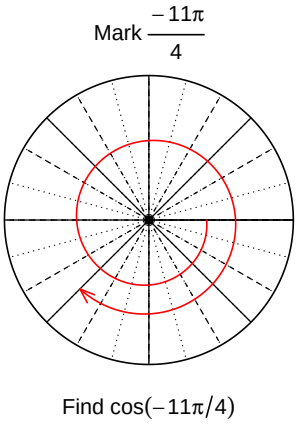
$L = 69.6$ meters.

Question 2

Consider angles $\frac{11\pi}{3}$ and $\frac{-11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{11\pi}{3}\right)$ and $\cos\left(\frac{-11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(11\pi/3)$



Find $\cos(-11\pi/4)$

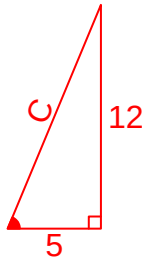
$\sin(11\pi/3) = \frac{-\sqrt{3}}{2}$

$\cos(-11\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{12}{5}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

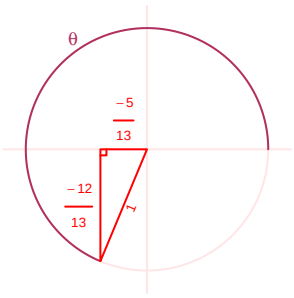
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$5^2 + 12^2 = C^2$$
$$C = \sqrt{5^2 + 12^2}$$
$$C = 13$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-5}{13}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 5.08 Hz, a midline at $y = 3.69$ meters, and an amplitude of 2.53 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 2.53\sin(2\pi 5.08t) + 3.69$$

or

$$y = 2.53\sin(10.16\pi t) + 3.69$$

or

$$y = 2.53\sin(31.92t) + 3.69$$